

# *Chapter 1*

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## WORLD OIL TRENDS

### INTRODUCTION

In considering the outlook for California's petroleum supplies, it is important to give attention to expectations of what the world oil market may look like over the next 20 years since the world market influences California's petroleum market. Will world oil demand increase and, if so, by how much? How will world oil prices be affected? Will the future production capacity of oil producing countries be adequate to meet demand? Will OPEC regain market share and greater control over prices? All of these variables affect what California consumers pay for gasoline, diesel and other petroleum products.

This chapter provides an overview of world oil trends and events and discusses some of the long term forecasts of world oil supply, demand and price. It concludes with a discussion of uncertainty in long-term forecasts and why energy diversity is an important policy to pursue even during times of apparent energy abundance.

### NEAR TERM

The competition between OPEC and nonOPEC producers continued through 1994. NonOPEC production continued to rise in 1994, weakening OPEC's market share of world production. World oil production, including natural gas liquids, increased by slightly over 1 percent in 1994 to approximately 66 million barrels per day. NonOPEC countries comprised almost 60 percent of this total. The International Energy Agency (IEA) expects

nonOPEC production to increase further in 1995 by approximately 600 thousand barrels per day.<sup>1</sup> Others expect nonOPEC production to continue to represent most of the increase in world oil production through the rest of this decade.<sup>2</sup>

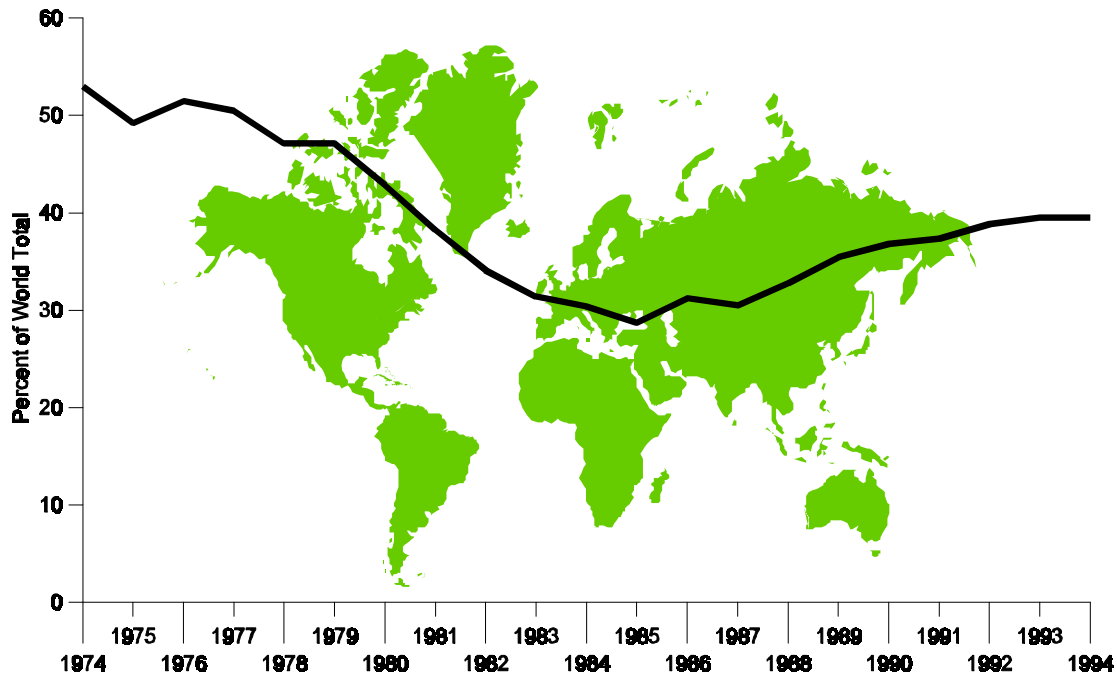
Production from two nonOPEC countries, however, continued to decline in 1994. Former Soviet Union production dropped by nearly 10 percent. Major discoveries have been made at Tengiz, in Kazakhstan, but unresolved agreements on export routes have limited development. Petroleum production in the United States, including natural gas liquids, dropped 2 percent in 1994 to approximately 8.5 million barrels per day, a record low. Production in the United States has decreased continually since 1985. Foreign imports now represent about half of petroleum supplies to the United States.

OPEC petroleum production also increased in 1994. Total OPEC production increased by nearly 1 percent. Venezuela and Kuwait accounted for most of the increase, adding nearly 300 thousand barrels per day. Most remaining member countries either decreased output or held their production stable. Iraq remains banned from selling oil on the world market, but some analysts expect that the country, when permitted, could immediately begin producing 2 million barrels per day with a longer term sustained output of over 3 million barrels per day. Prior to the Gulf War, Iraq was producing approximately 2.8 million barrels per day.

There is no consensus on the price effects of an Iraqi return to the world market. Some forecasts

Figure 1-1

## World Crude Oil Production OPEC Share



indicate that Iraqi production could be easily absorbed by increased demand in developing countries with little impact on world oil prices. Others expect additional downward pressure on prices over the next several years once Iraq production returns to the market.

Despite disagreements between oil producing and consuming countries on fuel taxes and oil revenue needs, the world oil market is now characterized by fewer countries trying to control or set oil prices and more countries encouraging foreign investment in developing indigenous resources. More partnerships are being formed between nations. Some countries, like Argentina and Venezuela, are actively privatizing oil field development. These conditions will likely produce further production gains as countries offer foreign investors more favorable terms. The overriding trend, however, is that oil development agreements are flourishing around the world.

### LONG TERM

As shown in Figure 1-1, OPEC's share of world crude oil production has rebounded from the lows of the mid 1980s and leveled off at approximately 40 percent over the last couple of years.<sup>3</sup> Their proven oil reserves are, however, quite large, with estimates ranging from approximately 66 percent to 77 percent of the world's total. Although OPEC is currently finding it difficult to influence world oil prices, many longer term forecasts show the world increasing dependence on OPEC resources and paying higher prices. The distribution of proven world oil reserves remains one of the more persuasive arguments for this conclusion.

Two forecasts that show increasing oil prices and increasing OPEC market share include the Canadian Energy Research Institute (CERI) and the International Energy Agency (IEA). The CERI reference case forecast assumes that both stagnant production from nonOPEC sources from 1997 to

2000 and strong demand growth allow for crude oil prices to increase.<sup>4</sup> In addition, OPEC production is forecast to increase from 26 million barrels per day in 1994 to 30.9 million barrels per day in 2000 and just over 40 million barrels per day in 2009.

The IEA's 1994 World Energy Outlook reference case scenario shows even stronger world demand growth for petroleum and higher prices than CERI's case. By 2010, world demand for crude oil could increase by 40 percent, or 1.8 percent per year. Oil demand in the industrialized countries of the Organization of Economic Cooperation and Development (OECD) is forecast to grow at 0.8 percent per year and 3.8 percent per year for the rest of the world.<sup>5</sup> The "rest of the world" designation includes China, Africa, East Asia, Latin America, South Asia and the Middle East. The price path assumed in this scenario is that real crude oil prices will rise gradually from about \$17 in 1995 to \$28 per barrel in 2005 and remain flat during the rest of the forecast period.

There are several important uncertainties in the IEA's reference case. One is that supplies from the former Soviet Union and Central and Eastern Europe, which are assumed to be small net exporters, could vary significantly. Another large uncertainty is how governments will respond to these anticipated world oil developments. In the IEA reference case, governments take no regulatory action to curtail demand. Several experts that testified before the Energy Commission criticized the IEA forecasts as overstating oil demand growth and OPEC influence. Long term prices in their view could be expected to range between \$15 and \$20 per barrel in 1995 dollars.

While oil prices are expected to remain relatively stable in the long term, oil demand in certain regions of the world is expected to show strong growth. Despite fuel costs that are three to four times greater than in the United States, Asian countries are expected to account for the most significant growth in world oil demand at 3 percent to 4 percent per year. This translates into 600,000 to 700,000 barrels per day per year. Testimony received indicates that the world oil market could readily supply this growth since world production capacity is also expanding.<sup>6</sup> Expectations are that for the next 10 years the increase in demand will be met by petroleum from the Middle East, West Africa, the North Sea and, to some extent, Vietnam.

Beyond 10 years, the Tarim Basin of China (about the size of Texas) may offer one of the world's last regions of Saudi Arabian size oil reserves.<sup>7</sup> Reserve estimates range from as little as a few billion barrels to as much as 240 billion barrels. This can be compared to China's current proven reserves of 24 billion barrels. Exploration and development costs are high and the desert environment is hostile with frequent sandstorms and shifting sand dunes over 500 feet high in some areas. Future production levels from the region remain uncertain.

Despite the expected growth in petroleum imports over the next decade by Asian countries, gasoline demand will likely be met by Asian refineries because governments stress refining self-sufficiency as an important goal. As a result, there is excess gasoline refining capacity from over-investing in refineries. It is possible that Japan, for example, may become a gasoline supplier to the West Coast within five years once the country drops regulations in 1996 that currently prohibit fuel exports to the United States.

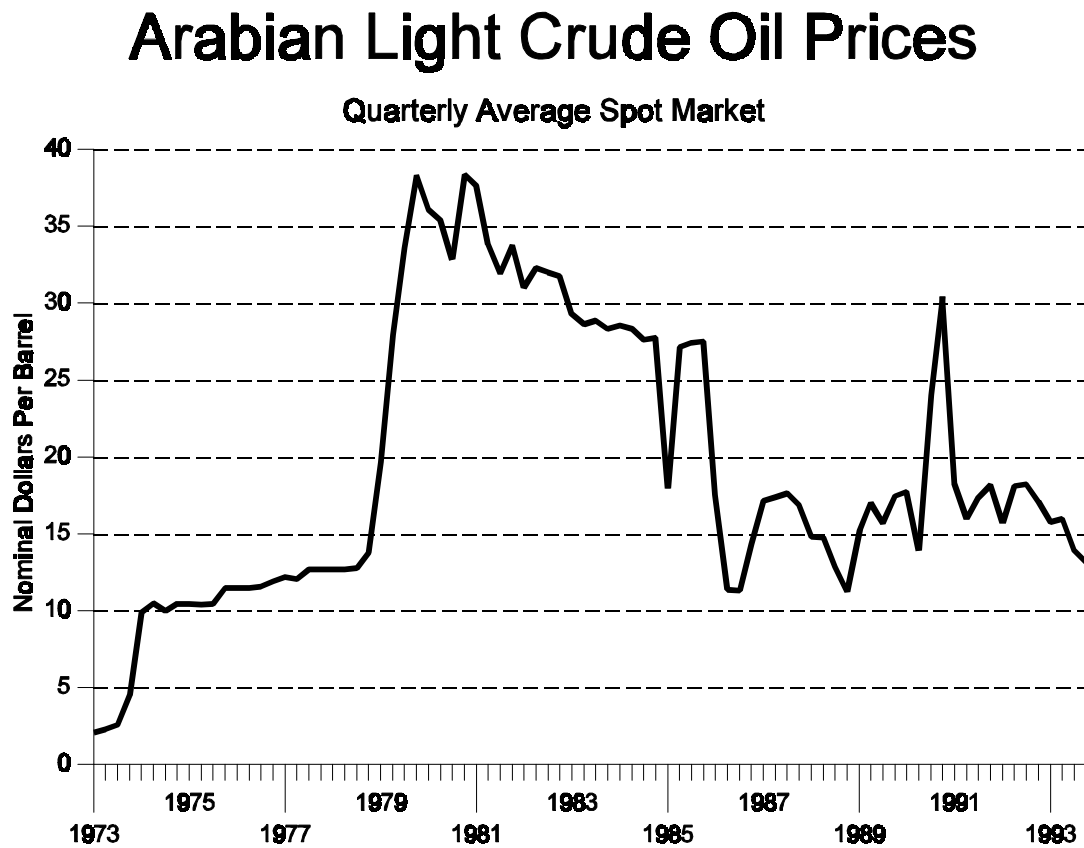
Diesel use in Asia, however, is expected to account for about half of the total product demand increase and refining capacity to produce high quality diesel is insufficient. California refiners who produce low sulfur diesel will have opportunities for sales to Pacific Rim countries.

In summary, many forecasters envision world oil demand increasing between 1 percent and 2 percent per year with more rapid growth in developing countries and slower growth in member countries of the OECD. Increasing foreign investment in oil development projects and privatization programs are expected to bring petroleum production gains. In the long term, the world will increasingly rely on the Middle East's immense oil reserves as demand in developing countries increases and supply from nonOPEC producers declines.

## ENERGY FORECASTING AND UNCERTAINTY

The conventional view of the future world oil market is one of relatively stable or gradually

Figure 1-2



increasing world oil prices during the 20-year forecast period. Several current conditions support this judgment. Proven world oil reserves estimates continue to increase, exceeding 1 trillion barrels in 1995. OPEC nations continue to argue over production quotas and nonOPEC oil continues to defy any short term expectations of declining production. Oil prices remain low in inflation adjusted terms as do product prices. The world also has witnessed how increasing oil prices produce increased supplies from formerly marginal prospects and how price-induced conservation results in downward price pressure. These indicators can foster complacency toward energy and its critical importance to world economic activity.

Although oil supplies appear to be abundant, uncertainty always exists when attempting to predict future market conditions and oil prices. Historical trends clearly demonstrate oil price volatility as any

petroleum fuel consumer during previous supply disruptions can confirm (see Figure 1-2).<sup>8</sup> Political events in major oil producing countries can still change the short-term supply and price outlook overnight. Even though stability characterizes oil prices today, it is sensible to expect that events yet to come will maintain the volatility of oil prices. It follows that the greater the dependence on oil during volatile price conditions, the greater the potential damage to economic activity. Cumulative losses to the United States (U.S.) economy from the price shocks of the past 20 years are estimated in the trillions of dollars.<sup>9</sup>

In a study completed in June 1995 for the U.S. Department of Energy, the Task Force on Strategic Energy Research and Development found that several conditions may lead to an erosion of national security and possible future supply disruptions.<sup>10</sup> Although the study emphasizes the value of energy

research and development, the findings apply equally well to conditions which could collectively produce future oil price increases. The list includes:

- A reduction of world excess oil production capacity
- Expanding world oil demand
- Declining United States production
- Growth in supply of oil from the volatile Middle East and reserve concentration in this region
- A world still full of risks

While future short-term supply disruptions will continue to prompt price shocks, future demand also could produce steeper price increases in the long term than currently expected. Participants in the Energy Commission's oil price surveys have weighted many factors which could contribute to more aggressive future oil price increases. In the most recent survey, the predominant factor is strong demand growth from developing nations. Most of the growth in world oil demand is expected to come from Asian countries. The rate of growth and the degree to which demand will be met with indigenous oil resources are, however, large uncertainties.

Countries such as China and India continue to experience significant economic growth. This change in the gross domestic product is not only associated with an overall increase in the demand for oil but also an increase in the per capita consumption of oil. Since these two countries possess over 2 billion people, even modest increases by world standards in their per capita oil consumption rates may have a significant impact upon world oil demand and prices. In 1992, China and India crude oil demand averaged approximately 0.7 barrels per person, compared to the United States average of 22.5 barrels per person and a world average of four barrels per person. If their combined average were to triple to 2.1 barrels per capita (similar to Thailand), world oil demand would increase by approximately 7 million barrels per day (11 percent of 1992 world production). Since this increase may occur gradually, the demand would likely be met by additional OPEC production.

China is the third largest energy consuming country in the world and its economy has grown over 9 percent per year since the 1980s.<sup>11</sup> While China relies on coal for over 75 percent of its energy requirements, the share of total demand met by coal is expected to decline dramatically from 68 percent in

1991 to 55 percent by 2010. At the same time, petroleum demand is expected to increase over 5 percent per year and represent 26 percent of total energy demand by 2010 from 17 percent in 1991.<sup>12</sup>

Transportation fuel demand in China is low at present, but the potential for growth as their economy and personal incomes grow is very large. The IEA estimates that road transportation energy demand will increase 7 percent per year between 1995 and 2010, even though roads are now relatively few in number and in poor condition. The poor condition of the existing transportation infrastructure has not curtailed popular interest in driving vehicles. A recent news account indicates that learning to drive in China is a popular and costly endeavor. Although thousands of driving students are paying more than a year in wages to learn to drive, they would need to spend over 30 years worth of wages to purchase an average priced vehicle in that country. Despite this high cost of vehicle ownership, the number of cars in China increased from 150,000 in 1979 to 1.4 million in 1995.<sup>13</sup>

On the supply side, China's petroleum production is expected to grow slowly through the 1990s increasing from about 3 million to 4 million barrels per day from 1995 to 2010. Most of this increase is assumed to originate from the Tarim Basin. If exploration of the basin is more successful, another 1 million barrels per day could be added to the production total, leaving imports to provide about 2 million barrels per day of supply. As previously noted, the Tarim Basin is viewed as a region of enormous oil development opportunity. Since work is just starting in that region, however, it is not known whether production will be high or low. If production does not meet expectations, then the country will rely more heavily on foreign imports. This could tighten world supplies and result in higher prices.

As with Iraq's eventual return to the world oil market, there is no clear consensus on the future world price of petroleum. Scenarios can be constructed which show declining world oil prices or more rapidly increasing prices. Dealing with these uncertainties means preparing for the possibility of higher priced oil in the future, even if the risk is perceived as small. It would be short sighted to do otherwise. The consequences of being unprepared can be extremely costly. From an energy policy perspective, conserving and diversifying

energy resources remains a prudent approach for California and the nation to mitigate the economic damage that higher oil prices can bring. It is one way of investing in insurance against the possibility of future adverse world oil events. Chapter 4 discusses fuel diversity at greater length and its progress in California.

## ENDNOTES

1. Petroleum Economist, February 1995, p. 6.
2. Testimony of Edward Krapels, Energy Security Analysis, 1995 Fuels Report Hearing, May 11, 1995.
3. Petroleum Economist, March 1995, p. 48.
4. Canadian Energy Research Institute, *Taxing the Difference, World Oil Market Projections, 1994-2009*, Study No. 59, August 1994.
5. Member countries of the OECD include: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom and United States.
6. Testimony of Edward Krapels, Energy Security Analysis, 1995 Fuels Report Hearing, May 11, 1995.
7. Ibid.
8. PennWell Publishing Company, *Energy Statistics Sourcebook*, Ninth Edition, August 1994.
9. U.S. Department of Energy, *Energy R&D: Shaping Our Nation's Future in a Competitive World, Final Report of the Task Force on Strategic Energy Research and Development*, June 1995, p. IX.
10. Secretary of Energy Advisory Board, U.S. Department of Energy, *Energy R&D: Shaping our Nation's Future in a Competitive World*, June 1995.
11. International Energy Agency, *World Energy Outlook*, 1994 Edition, p. 165.
12. Ibid., p. 170.
13. San Francisco Chronicle, "In Land of Few Cars, Learning to Drive Becomes All the Rage," July 28, 1995.